

A microscopic image of neural tissue, showing a complex network of fibers and cells. Some fibers are highlighted in bright orange, while others are in a pale blue/white. The background is dark, making the glowing structures stand out.

PSYCHEDELIC-ASSISTED NEUROREHABILITATION

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Introduction



Psychedelic-assisted neurorehabilitation is a novel approach aimed at enhancing recovery from neurological conditions such as stroke, concussion, and brain injury.

This ebook delves into the fascinating world of psychedelic-assisted neurorehabilitation, exploring the concepts of neuroplasticity, metaplasticity, and anti-inflammatory effects.

We will also examine the groundbreaking research conducted in this field.

What is Neurorehabilitation?

Neurorehabilitation is a specialized form of rehabilitation aimed at restoring function and reducing disability in individuals with neurological conditions. It involves a range of interventions and therapies, but the introduction of psychedelics as an assistive tool represents a significant paradigm shift.

In this section, we will explore the traditional methods of neurorehabilitation and how psychedelics can complement these approaches.

Read More

Understanding Neurorehabilitation |
World Health Organization



The Role of **Psychedelics**

Psychedelics have been shown to alter perception, mood, and cognitive processes.
More importantly, they have been found to induce neuroplasticity - the brain's ability to adapt and change.

According to various studies, psychedelics have three principal effects that can benefit neurorehabilitation:

Psychedelics have been demonstrated to increase neuroplasticity / metaplasticity

Psychedelics have been demonstrated to re-open critical periods (CP) of development

This may include motor, sensory, and other types of critical periods

It may be possible to leverage this re-opening of CP paired with adjunctive interventions to elicit context-dependent re-learning experience akin to acute periods of neurological responsiveness/repair

1

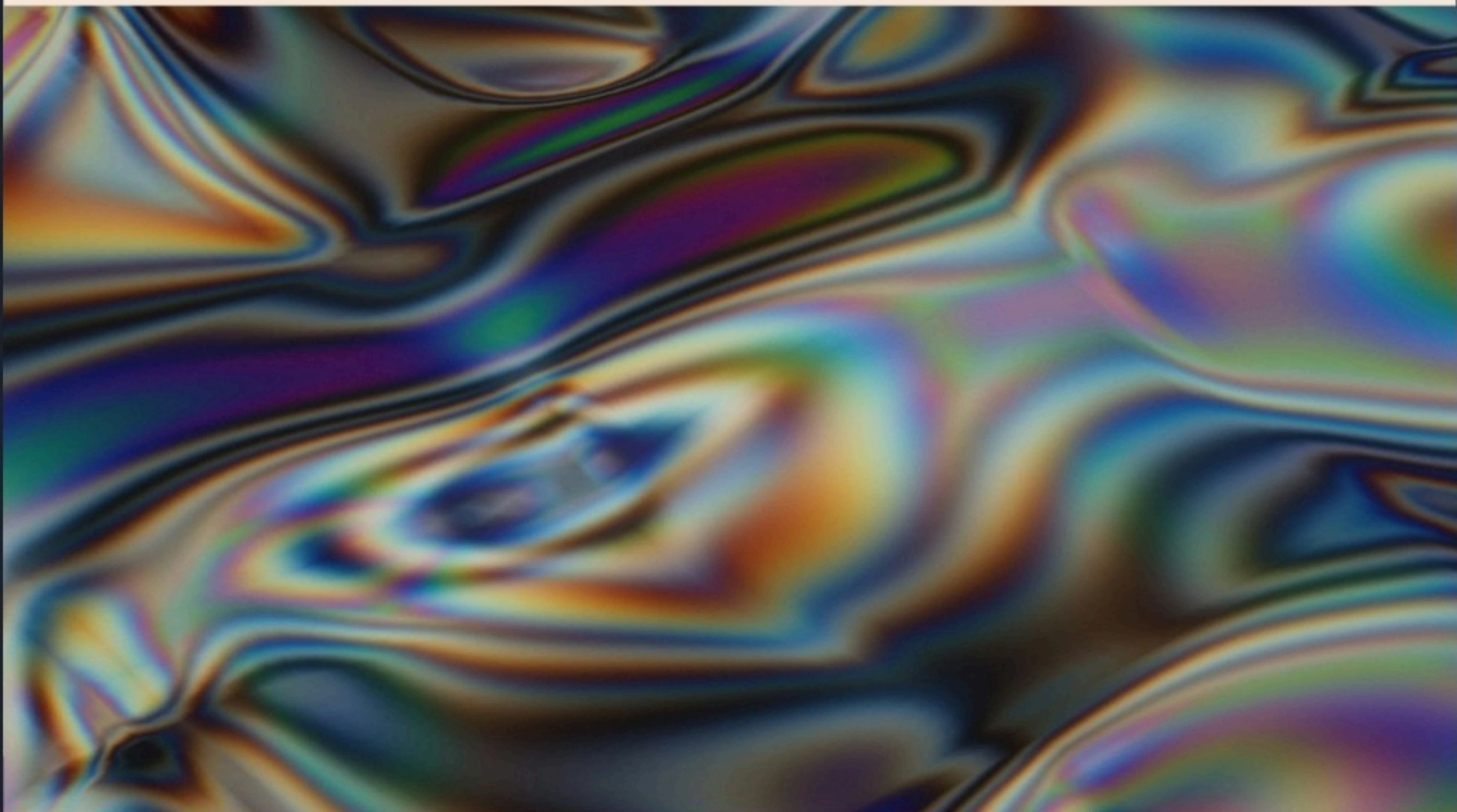
Induction of neuroplasticity /metaplasticity
can lead to functional recovery

2

Modification of anti-inflammatory responses
which can reduce neuroinflammation

3

Enhancement of mood and cognition
which can improve patient engagement



Critical Periods and Windows of Neuroplasticity

“there are developmental “critical” periods with exquisite sensitivity to environmental input... psychedelics may remove the brakes on adult neuroplasticity, inducing a state similar to that of neurodevelopment.”

- Dr. Lauren Lepow

“It might be that if what it feels like to be in that altered state of consciousness or that mystical experience that we think of with psychedelics is just what it feels like to reopen critical periods”

- Dr. Gül Dölen, MD, PhD

“Really what psychedelics are are this master key for unlocking critical periods....

There are lots of different critical periods... we are beginning to get a sense that many of the critical periods close using the same sort of governing principle, the same kind of molecules, if not the exact same molecules, & will or have been implicated in the closure of, say, the visual critical period or the touch critical period or the motor critical period.”

- Dr. Gül Dölen, MD, PhD





Research and Findings

With Neurological Trauma such as concussion, stroke, and brain injury there is a short period, a critical period, of neuroplasticity in which the brain heals itself and creates new neural connections. Like all critical periods, this window closes, in this case within a few months after an injury

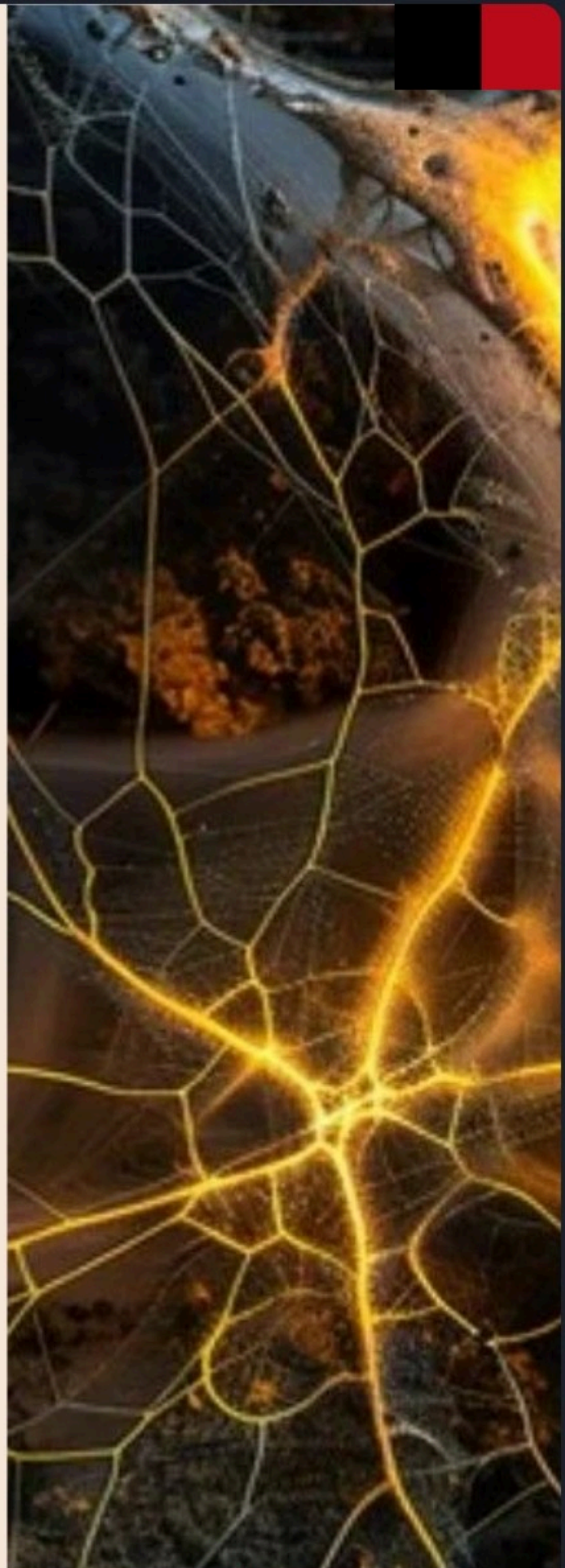
Combining psychedelics with physical therapy in digitally enriched environments may restore the ability to recover functionality after stroke, concussion, or brain injury, even in cases where the injury occurred months to years prior.”

Impact of Psychedelic on Neuroplasticity

Psychedelics play a crucial role in enhancing neuroplasticity, the brain's ability to form and reorganize connections in response to learning and experience.

They induce the release of various neurotrophic factors which promote the growth and differentiation of neurons.

Additionally, psychedelics have been shown to alter gene expression patterns associated with synaptic plasticity and memory formation.



Other **Benefits of Psychedelics** in Neurorehabilitation

REDUCES OXIDATIVE STRESS, MITOCHONDRIAL DYSFUNCTION, & EXCITOTOXICITY

Psilocybin mushrooms have potent antioxidant effects. Serotonergic psychedelics like psilocybin are able to buffer from stress on the brain by increasing the oxidative capacity of neurons.

PROMOTES NEUROPROTECTION & BLOOD FLOW

Psychedelics can reduce cell death and increase brain-derived neurotrophic factor (BDNF) that is important in healing and neuroprotection. Serotonergic psychedelics directly bind to TrkB, a protein that binds to BDNF, at a rate 1000x greater than anti-depressants and inhibits factors of cognitive decline and neurodegeneration.

REDUCES NEUROINFLAMMATION

Psilocybin can influence the body's immune response markers and lower pro-inflammatory cytokines such as $\text{TNF-}\alpha$, $\text{IL-1}\beta$, & IL-6

NETWORK-WIDE BRAIN CHANGES

Psychedelics increase global functional connectivity and synchronized timing of neural activity between distinct brain regions and functional brain networks. This has been shown to allow for lasting changes in brain areas, bolstering cognitive processes & positive shifts in mood

